

in racemose fashion in the axil of phyllodes. Fruits, c. 11-13 cm long, c. 5-6 mm wide, slightly constricted between the seeds, grayish-brown in colour. Seeds black.

Fl. & Fr.: May-August.

Specimens Examined: Near Jaipur road, Bikaner.

Kantiya and Sharma. 1234.

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23. ENUMERATION OF SPECIES OF THE GENUS *CORNOPTERIS* NAKAI (ATHYRIACEAE: PTERIDOPHYTA) IN INDIA¹

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Cornopteris Nakai (Athyriaceae) is a small Asian genus consisting of nine species (Kato 1979), of which four species, namely *C. banajaoensis* (C.Chr.) K. Iwats. & Price, *C. birii* Ching ex Bir, *C. opaca* (D. Don) Tag. and *C. quadripinnatifida* M. Kato were recorded from the east Himalaya (Darjeeling, Sikkim and Arunachal Pradesh) and north-east India (Assam, Meghalaya, Nagaland, Manipur, Tripura). But recently, Fraser-Jenkins (1997) discovered that the description of *C. birii* was based on only one specimen, the type specimen collected by Prof. S.S. Bir from Lachen (north Sikkim), and that it was an immature specimen of *C. decurrentialata* (Hook.) Nakai, and placed it as a synonym of *C. decurrentialata*. However, recently published enumerations of ferns of India, record a varying number of species (Dixit 1984; Chandra 2000), while Vasudeva *et al.* (1990) make no reference of the genus *Cornopteris* in north-east India.

In this paper, an attempt has been made to enumerate the species of *Cornopteris* in India with complete references of synonyms, and distribution in India and the world, along with a note on doubtful records from India to avoid confusion. They are as follows:

1. Fronds bipinnatifid to tripinnatifid:
 - Rhizome creeping; pinnule segments entire or denticulate-serrulate *C. decurrentialata*
 - Rhizome ascending to erect; pinnule segments entire or shallowly lobed *C. opaca*
2. Fronds tripinnatifid to quadripinnatifid:
 - Apex of pinnule segments almost entire or crenate *C. banajaoensis*
 - Apex of pinnule segments sharply serrate *C. quadripinnatifida*

1. *Cornopteris banajaoensis* (C.Chr.) K. Iwats. & Price, Southeast Asian Studies 14: 564 (1977); Kato, Acta Phytotax.

Geobot. 30: 112 (1979); Chandra, Ferns India: 142 (2000).

Dryopteris banajaoensis C.Chr., Index Fil. Suppl. 1: 30 (1913).

Dryopteris tenerrima Copel., Philip. J. Sci. Bot. 4: 111 (1909) [non (Fee) Ros. (1906)].

Phegopteris banajaoensis (C.Chr.) v.A.v.R., Mal. Ferns & Fern Allies Suppl. 1: 310 (1917).

Athyrium nudum Copel., Fern Fl. Phil. 3: 391 (1960).

Dryopteris fluvialis Hayata, Ico. Pl. Formos. 4: 152.f94 (1914).

Cornopteris fluvialis (Hayata) Tag., Acta Phytotax. Geobot. 1: 158 (1932).

Athyrium fluviale (Hayata) C.Chr., Index Fil. Suppl. 3: 44 (1934).

Dryopteris athyriiformis Ros., Hedwigia 56: 344 (1915).

Cornopteris tashiori Tag., Acta Phytotax. Geobot. 1: 159 (1932).

Athyrium tagawai C.Chr., Index Fil. Suppl. 3: 44 (1934).

Cornopteris badia Ching, Bull. Fan Mem. Inst. Biol. Bot. 11: 58 (1941).

Distribution: INDIA: Sikkim; E. Nepal; S.W. China; Philippines; Taiwan; S. Japan; Papua; New Guinea.

2. *Cornopteris decurrentialata* (Hook.) Nakai, Bot. Mag Tokyo 44: 8(1930); Fraser-Jenkins, New Sp. Syndr. Indian Pterid. & Ferns India: 93 (1997); Chandra, Ferns India: 143 (2000).

Gymnogramme decurrentialata Hook., Sp. Fil. 5: 142. t. 294 (1864).

Leptogramme decurrentialata (Hook.) J. Smith, Hist. Fil. :232 (1875).

Phegopteris decurrentialata (Hook.) Christ, Farnkr.: 274. f. 865 (1897).

Nephrodium decurrentialatum (Hook.) Diels in Engler

& Prantl Nat. Pfl.-fam. 1(4):171 (1899).

Dryopteris decurrentialata (Hook.) C.Chr., Index Fil.: 261 (1905).

Athyrium decurrentialatum (Hook.) Copel., Philip. J. Sci. 3: 279 (1908).

Diplazium decurrentialatum (Hook.) C.Chr., Bull. Geogr. Bot. Mans 21: 69 (1911).

Diplazium hookerianum Koidz., Bot. Mag. Tokyo 38: 105 (1924).

Cornopteris musashiensis Nakai, Bot. Mag. Tokyo 44: 8 (1930).

Athyrium musashiensis (Nakai) C.Chr., Index Fil. Suppl. 3: 43 (1934).

Cornopteris decurrentialata var. *pilosella* H.Ito, Bot. Mag. Tokyo 52: 588 (1938).

Athyrium decurrentialatum var. *pilosellum* (H.Ito) Ohwi, Fl. Jap. Pterid.: 110 (1957).

Cornopteris tsangii Ching, Lingnan Sci. J. 21: 32 (1945).

Cornopteris birii Ching & Bir, Nova Hedw. 7:502 (1964); Mehra & Bir, Res. Bull. Punjab Univ. (n.s.) 15:149 (1964); Dixit, Census Indian Pterid.: 130 (1984).

Distribution: INDIA: Sikkim; Nepal; C. & S. China; Taiwan; S. Korea; Japan.

3. *Cornopteris opaca* (D.Don) Tag., Acta Phytotax. Geobot. 8:92 (1939); Dixit, Census Indian Pterid.: 130 (1984); Chandra, Ferns India: 143 (2000).

Hemionitis opaca D.Don, Prodr. Fl. Nepal.: 13 (1825).

Gymnogramma opaca (D.Don) Spr., Syst. 4: 39 (1827).

Phegopteris opaca (D.Don) Mett., Pheg.-Asp.: 15.n.21 (1858).

Leptogramma opaca (D.Don) Bedd., Handb. Ferns Brit. India: 379 (1883).

Dryopteris opaca (D.Don) C.Chr., Index Fil.: 280 (1905).

Diplazium opacum (D.Don) Christ, Bull. Geogr. Bot. Mans 1906: 242 (1906).

Athyrium opacum (D.Don) Copel., Philip. J. Sci. 3: 279 (1908).

Gymnogramma obtusata Bl., Enum. Pl. Jav. 2: 113 (1828).

Leptogramma obtusata (Blume) J. Smith, Hist. Fil.: 232 (1875).

Phegopteris obtusata (Bl.) Christ, Farnkr. :274 (1897).

Nephrodium obtusatum (Bl.) Diels in Enler & Prantl Nat. Pfl.-fam. 1(4): 171 (1899).

Dryopteris bankinsinensis Hayata, Icon. Pl. Formos. 8: 146, f.1.73-74

Dryopteris succulentipes Hayata, Icon. Pl. Formos. 8: 149. f. 77-78 (1919).

Athyrium gymnocarpum Copel., Philip. J. Sci. 40: 301. t. 4 (1929).

Cornopteris likiangensis Ching, Lingnan Sci. J. 21: 32 (1945).

Cornopteris omeigensis Ching, Bull. Fan Mem. Inst. Biol. Bot. 1: 287 (1949).

Cornopteris opaca f. *glabrescens* Kurata, J. Goebot. 12: 41 (1963).

Distribution: INDIA: Darjeeling, Sikkim Meghalaya; Myanmar; S. China; Taiwan; S. Japan; Indo-China; N. Thailand; Philippines; Borneo; Java; Bali; Sulawesi.

4. *Cornopteris quadripinnatifida* M. Kato, Acta Phytotax. Geobot. 30: 114.f.11 (1979).

Distribution: INDIA: Uttarakhand, West Bengal, Sikkim; Nepal.

Dixit (1984) reported four species of *Cornopteris* from India, i.e., *C. birii*, *C. macdonellii* (Bedd.) Tard., *C. opaca* and *C. tenuisecta* (Bl.) Tard. Except *C. opaca*, the other three species are now treated as synonyms of *C. decurrentialata*, *Deparia macdonellii* Kato and *Acystopteris tenuisecta* (Bl.) Tag. Khullar (2000) described *C. quadripinnatifida* (a species poorly known in India) as *C. banajaoensis* from Garhwal and Kumaon in Uttaranchal (=Uttarakhand), followed by Chandra (2000), Pande and Pande (2002), Dixit and Kumar (2002) from the same localities. Fraser-Jenkins (pers. comm.) tentatively identified the above specimens, with the remark that it required further confirmation. He has now identified these specimens as belonging to *C. quadripinnatifida*, while *C. banajaoensis* was reported earlier from Uttaranchal in the west Himalaya by Khullar (2000), and by Dixit and Kumar (2002) is *C. quadripinnatifida*. Therefore, *C. quadripinnatifida* is being recorded for the first time from the west Himalaya and thus extends its distribution to Uttarakhand from Sikkim and E. Nepal.

Chandra (2000) enumerated five species of *Cornopteris* from India, namely *C. atroviridis* (v.A.v.R.) M. Kato, *C. banajaoensis*, *C. crenuloserrulata* (Makino) Nakai, *C. decurrentialata* and *C. opaca*, but he has not recorded *C. quadripinnatifida* in his enumeration. Of them, *C. atroviridis* is a Malayan, Sumatran and Javan species and *C. crenuloserrulata* is reported only from C. & S.E. China and C. & N. Japan. Both these species have been erroneously recorded from Kumaon Himalaya by Punetha and Kholia (1990) in India. Fraser-Jenkins (pers. comm.) has identified Punetha and Kholia's specimens, collected from Didihat in Pithoragarh district of Kumaon Himalaya in 1996, as *Deparia boryana* (Willd.) Kato [= *Dryoathyrium boyanum* (Willd.) Tard.-Blot]. It is interesting to note that these two species, namely *C. atroviridis* and *C. crenuloserrulata* have been catalogued (Chandra 2000; Pande and Pande 2002; Dixit and Kumar 2002) from the same locality without verifying and studying these specimens. *C. atroviridis* and

C. crenuloserrulata do not occur in India and should be excluded from the Indian fern literature to avoid confusion.

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24. *PLAGIOCHILA JUNGHUHNIANA* SANDE LAC. – A NEW RECORD TO INDIAN MAINLAND (NILGIRI HILLS, WESTERN GHATS)¹

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Introduction

Plagiochila junghuhniana belongs to the Family Plagiochilaceae of Hepaticae. The species was introduced from Indonesia (Java) by Sande Lacoste in 1855. Earlier this species was reported from the Nicobar Islands as *P. berkeleyana* Gott. ex Steph. by Stephani (1918). Since then this species has never been collected from India. In a recent publication, *P. berkeleyana* has been treated as a synonym of *P. junghuhniana* Sande Lac (So 2001). During a plant collection trip to the Western Ghats and neighbouring areas this species was collected from the Nilgiri hills, thus showing an extended range of distribution to the Indian mainland. It belongs to *Plagiochila* sect. *Contiguae* in having characteristic oblong-ovate to broadly ovate leaves, moderately decurrent dorsal base of leaves and shortly decurrent ventral base with spinose teeth and medium to large trigones in leaf cells. The most important characteristic of the section is asexual reproduction by leaf propagules developing from ventral surface of leaves (So and Grolle 1999; So 2000). In India, the section is represented by 11 species (*Plagiochila khasiana* Mitt., *P. salacensis* Gott., *P. dissecta* Steph., *P. beddomei* Steph., *P. indica* Mitt. ex Steph., *P. nepalensis* Lindenb., *P. acuta* Steph., and *P. junghuhniana*

Sande Lac., *P. liebmanniana* Lehm. et Lindenb., *P. wightii* Steph. and *P. woronofii* Steph. ex Pande et al.) out of which the last eight are validly reported from the Western Ghats (Rawat and Srivastava 2007).

Plants decumbent, in compact tufts, up to 45 mm long, 2.8-3.2 mm wide, branching terminal (pseudo-dichotomous), “*Frullania*-type”. Stem 13-15 cells across the diameter, differentiated, cortex in 3-4 layers, cells thick-walled, 19-22 x 15-19 µm. medullary cells thin-walled, 30-38 x 22-26 µm. Rhizoids spreading along the basal surface of the stem. Leaves contiguous to sub-imbricate, obliquely inserted, horizontally spreading, oblong-ovate, 1.3-1.6 mm long, 0.63-0.94 mm wide with (4) 6-11 (12) teeth per leaf; dorsal margin straight, entire, base decurrent, apex broad (truncate) with 3-6 teeth, 5-6 cells long, and 3-4 cells wide, ventral margin arched, base ampliate with 2-6 small spines, 4-5 cells long teeth, terminal cell acute, 10 x 21 µm, median cells 34-42 x 26-34 µm, basal cells 38-50 x 26-39 µm, trigones distinct. Underleaves vestigial generally present in the upper sector of plant, may be ciliate or variously toothed. Asexual reproduction by propagules.

Dioecious. Gynoecia always terminal on main shoots, with two innovations; female bracts longer than wide,